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TR-42: Engineering Committee on Premises Telecommunications Cabling

Date: June 12, 2007

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From: Herb Congdon, Chair, TR-42 (hvcongdon@tycoelectronics.com)

Subject: Clarification on De-rating Guidance

Thank you for your liaison dated March 15th, 2007 requesting addition clarification on de-rating values. Here are responses to your questions provided by the TR-42.7 subcommittee.

IEEE question 1:

We have noticed an inconsistency between the temperature versus current specification in our existing PoE (IEEE 802.3-2005, Clause 33) Standard and your recommended temperature versus current carrying capacity de-rating profile. In particular, the IEEE Std 802.3-2005 referenced cable specification of 350 mA (175 mA per conductor) of current up to and including 60 degrees C over 2 pairs. In your opinion, will the temperature rise that may be associated with the 802.3-2005 current adversely affect the transmission performance of category 3 and higher rated cabling in typical installation scenarios?

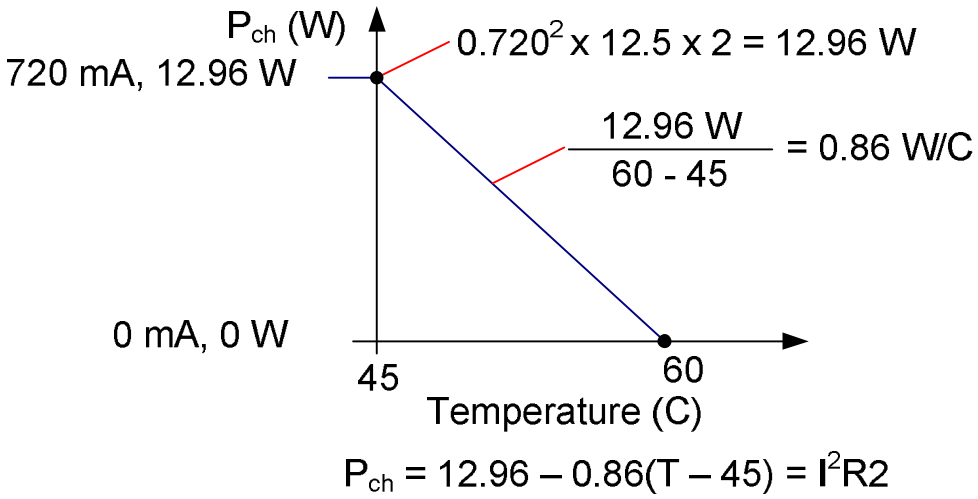
Answer:

Any current along a cable will cause the cable temperature to rise and result in an increase of the insertion loss. We have not investigated the temperature rise for category 3 but we expect it to behave similar to that of category 5e but with a larger increase in the insertion loss. TR-42 specifies the insertion loss of category 3 and higher-rated cable at 20 °C for lengths of 100 m. The insertion loss of some category 3 and higher-rated cables, such as those constructed with PVC insulation, have a temperature dependency. A temperature coefficient of insertion loss of 1.5 % per °C is typical for category 3 cables and a temperature coefficient of insertion loss of 0.4 % to 0.6 % per °C is typical for category 5e and higher-rated cables. Please consider this correction term for transmission-related effects related to specific temperature rise. The current of 175mA per conductor specified

in 802.3-2005 will not significantly affect the insertion loss of category 3 or higher-rated cabling because the temperature rise is limited in most installations and environments.

IEEE question 2:

Please see the attached graph. Does this graph accurately reflect your de-rating guidance per the technical contribution?



$P_{ch} = 12.96 – 0.86(T – 45) = I^2R2$

Answer:

The graph does not reflect our recommended de-rating. Instead, TR-42.7's de-rating recommendation for the temperature range of 45 ºC to 60 ºC is intended for high power applications of 30 watts over two pairs, not 12.96 watts over two pairs as shown in the diagram. Note that the temperature de-rating break point for 12.96 watts actually occurs at a higher temperature. The de-rating of the total power to a cable bundle is still under study and is intended to limit the maximum total power into a cable bundle; not the power of each individual PSE or PD.

Best regards,

Herb Congdon